

WHAT IS CLAIMED IS:

1. A battery comprising:

a power generating element container;

5 a positive electrode mixture opposing an inner  
surface of the power generating element container;  
a negative electrode gel provided in the power  
generating element container and containing a negative  
electrode active material and an aqueous electrolysis  
solution;

10 a separator provided between the positive  
electrode mixture and the negative electrode gel; and  
a hydrogen gas permeable sheet provided in an  
opening of the power generating element container, the  
hydrogen gas permeable sheet having a water repellence  
15 of 2 kPa or more and a He gas permeability at 30°C in  
a range of  $2 \times 10^{-6}$  to  $10000 \times 10^{-6}$  (cm<sup>3</sup> (STP)  
cm/sec·cm<sup>2</sup>·cmHg),

wherein a distance between the positive electrode  
mixture and the hydrogen gas permeable sheet gradually  
20 decreases toward a side wall of the power generating  
element container.

2. The battery of claim 1, wherein the hydrogen  
gas permeable sheet is fixed by a liquid gasket of  
which junction limit pressure is 80 kgf/cm<sup>2</sup> or less at  
25 the opening of the power generating element container.

3. The battery of claim 1, wherein a peripheral  
edge of the hydrogen gas permeable sheet is folded

toward the positive electrode mixture.

4. The battery of claim 1, wherein an air space is provided between the hydrogen gas permeable sheet and the positive electrode mixture.

5 5. The battery of claim 1, wherein an inclination angle of the hydrogen gas permeable sheet to a surface of the positive electrode mixture is in a range of 3 degree to 65 degrees.

6. The battery of claim 1, wherein a thickness of  
10 the hydrogen gas permeable sheet is in a range of 0.1 mm to 3 mm.

7. The battery of claim 1, wherein recesses are formed in a surface facing the positive electrode mixture of the hydrogen gas permeable sheet.

15 8. The battery of claim 7, wherein a depth of the recesses satisfies the following formula (1):

$$0.01X \leq D \leq 0.95X \quad (1)$$

where D is the depth of each recess ( $\mu\text{m}$ ) and X is a thickness of the hydrogen gas permeable sheet ( $\mu\text{m}$ ).

20 9. A battery comprising:

a negative electrode container;

a positive electrode mixture provided in the negative electrode container, and holding an aqueous electrolysis solution;

25 a separator provided between an inner surface of the negative electrode container and the positive electrode mixture; and

a hydrogen gas permeable sheet provided in an opening of the negative electrode container, the hydrogen gas permeable sheet having a water repellence of 2 kPa or more and a He gas permeability at 30°C in a range of  $2 \times 10^{-6}$  to  $10000 \times 10^{-6}$  (cm<sup>3</sup> (STP) cm/sec·cm<sup>2</sup>·cmHg),

wherein a distance between the positive electrode mixture and the hydrogen gas permeable sheet gradually decreases away from a side wall of the negative electrode container.

10. The battery of claim 9, wherein the hydrogen gas permeable sheet is fixed by a liquid gasket of which junction limit pressure is 80 kgf/cm<sup>2</sup> or less at the opening of the negative electrode container.

11. The battery of claim 9, wherein the hydrogen gas permeable sheet is inclined in a conical form.

12. The battery of claim 9, wherein an air space is provided between the hydrogen gas permeable sheet and the positive electrode mixture.

13. The battery of claim 9, wherein an inclination angle of the hydrogen gas permeable sheet to a surface of the positive electrode mixture is in a range of 3 degree to 65 degrees.

14. The battery of claim 9, wherein a thickness of the hydrogen gas permeable sheet is in a range of 0.1 mm to 3 mm.

15. The battery of claim 9, wherein recesses are formed in a surface facing the positive electrode mixture of the hydrogen gas permeable sheet.

5 16. The battery of claim 15, wherein a depth of the recesses satisfies the following formula (1):

$$0.01X \leq D \leq 0.95X \quad (1)$$

where D is the depth of each recess ( $\mu\text{m}$ ) and X is a thickness of the hydrogen gas permeable sheet ( $\mu\text{m}$ ).

10 17. A battery comprising:  
a battery case;  
a power generating element provided in the battery case and including an aqueous electrolysis solution;  
and

15 a hydrogen gas permeable sheet provided in an opening of the battery case, the hydrogen gas permeable sheet having a water repellence of 2 kPa or more and a He gas permeability at 30°C in a range of  $2 \times 10^{-6}$  to  $10000 \times 10^{-6}$  ( $\text{cm}^3$  (STP)  $\text{cm}/\text{sec} \cdot \text{cm}^2 \cdot \text{cmHg}$ ),

20 wherein the hydrogen gas permeable sheet has a surface that faces the power generating element and has recesses satisfying the following formula (1):

$$0.01X \leq D \leq 0.95X \quad (1)$$

where D is a depth of each recess ( $\mu\text{m}$ ) and X is a thickness of the hydrogen gas permeable sheet ( $\mu\text{m}$ ).

25 18. The battery of claim 17, wherein the power generating element contains at least one of aluminum and aluminum alloy as a negative electrode active

material, and the electrolysis solution contains at least one ion of sulfate ion and nitrate ion.